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rage and indignity, but was helpless to prevent the ransacking and plunder of the observatory by armed miscreants, and his downfall, directly due to political conditions and attended by the insults and petty persecutions of his former subordinates, marks the close of the present volume, although Mr. Wolf's significant paragraph, 'He retired to his estate at Thury, where we shall encounter him in the sequel of this history,' suggests a volume still to follow.

Scattered throughout the present work are to be found interesting glimpses of scientific life and work in bygone generations: *e. g.*, the first Cassini seeking to introduce into France, from his native Italy, the arts of glass making and telescope building as prerequisites to the growth of astronomy; and a casual account of the very long telescopes then in vogue, with a welcome explanation of the manner in which observations were conducted with an objective and ocular placed a hundred, or more, feet apart with no intervening tube. Turning to matters of a more personal character, we catch glimpses of Academicians quarreling over rights of domicile in chambers hung with tapestry but devoid of beds and tables. With more of mirth than surprise do we find one of the Cassinis protesting in vain, that the observatory windows should be glazed before he is required to store within it unwelcome instruments thrust upon him by administrative decree; and with very different emotions we read the pathetic account of Picard, close to the discovery of the aberration of light a century before Bradley's time, but dying just before completion of the instruments that had been ordered expressly for investigation of the suspicious phenomena.

In mechanical execution the volume worthily maintains the traditions of the house of Gauthier-Villars, but its usefulness is impaired by lack of an index.

GEORGE C. COMSTOCK.

MADISON, WIS.

The Grasses of Iowa. By L. H. PAMMEL, Ph.D., J. B. WEEMS, Ph.D., of Iowa State College of Agriculture and the Mechanic Arts, and F. LAMSON-SCRIBNER,

Agrostologist, U. S. Department of Agriculture, Des Moines, Iowa. F. R. Conway, State Printer, 1901. Bulletin No. I, of the Iowa Geological Survey. Pp. 525; with 11 plates and 514 engravings.

This is a great credit to the author and to the State Geologist who had the good sense to secure its preparation. The work treats of anatomy of the grasses, the roots, stems, leaves, flowers, grain, hybrids; purity and vitality of grass seed, cereals, fungus diseases of grasses, bacterial diseases, pastures and meadows of Iowa, weeds of meadows and pastures, chemistry of foods and feeding, lawns and lawn making in Iowa. The plates and figures are excellent and the whole work seems to be up-to-date, excepting some of the names of plants. Nearly all of the grasses of the state are illustrated, some legumes and weeds.

The authors must have devoted much time in making investigations, reading the best modern works on the subjects treated, including reports of scientific societies, bulletins of the U. S. Department of Agriculture, and of the numerous State Experiment Stations. There are many instances given showing that numerous wild grasses are superior for cultivation to those introduced from Europe. The following are the most important grasses for the State of Iowa: *Poa pratensis*, *Phleum pratense*, *Bromus inermis*, *B. breviaristatus*, *Dactylis glomerata*, *Agropyron spicatum*, *Andropogon provincialis*, *A. nutans*, *Agrostis alba*, *Calamagrostis Canadensis*, *Panicum virgatum*. For general cultivation *Poa pratensis*, *Phleum pratense*, and *Bromus inermis* are the most valuable; for shaded ground *Dactylis glomerata* and *Agrostis alba*; for low grounds *Agrostis alba*, *Poa serotina*, *P. pratensis*, *Calamagrostis Canadensis*; for dry hills *Bouteloua oligostachya*, *B. racemosa*; for alluvial bottoms *Andropogon provincialis*, and *Spartina cynosuroides*; for the loess of western Iowa *Agropyron spicatum*, *Andropogon scoparius*.

Large numbers of chemical analyses were made in grasses in their natural condition and when free from water, indicating the per cent. of fat, protein, albuminoids, crude fiber, ash and nitrogen-free extract.

The index is unusually complete, which greatly aids the use of the volume.

The work contains but little that will interest the farmer, nor can it be expected that any person could prepare such a work, on account of the necessary technicalities of the subject, but it is just the thing to fall into the hands of the botanist, the professor of agriculture and students pursuing an agricultural course.

W. J. BEAL.

AGRICULTURAL COLLEGE, MICH.

Elementary Course of Practical Zoology. By the late T. JEFFREY PARKER and W. N. PARKER. London, Macmillan & Co. 1900. Pp. 608; 156 illustrations.

Although this book was published abroad about eighteen months ago, it is practically recent in this country, having been introduced by the New York publishers during the present academic year. It is not yet widely known and has not received from American teachers and students of zoology the attention which it deserves.

Almost twenty-five years ago Huxley wrote in the preface to his now classical 'The Crayfish as an Introduction to the Study of Zoology' these words: 'I have desired to show how the careful study of one of the commonest and most insignificant of animals leads us, step by step, from everyday knowledge to the widest generalizations and the most difficult problems of zoology; and, indeed, of biological science in general.' Every zoologist knows how well Huxley succeeded in introducing the readers of 'The Crayfish' to the great principles and methods of the science. Unfortunately, the work was better adapted for reading than for the modern laboratory method of teaching, and hence this masterpiece among introductory books on zoology has become a reference work. But its central idea has made a deep impression on the teaching of zoology, and it is therefore with pleasure that we welcome a book in which the pupils of the master of zoological teaching have given his suggestion a new and more complete development in adaptation to the laboratory method. In the 'Practical Zoology' by the Parker brothers we now have in the form of a handbook for stu-

dents an introduction to zoology based upon Huxley's idea of a careful study of a common animal considered from the standpoint of the several phases of zoology. But the frog and not the crayfish is the chosen type.

One might infer from the title that the book is exclusively a laboratory manual; but, on the contrary, there are extensive descriptions of the types to be studied in the laboratory and good presentation of zoological principles, so that the book is really a text-book and laboratory manual combined.

In Part I., consisting of 228 pages, the frog is thoroughly treated with regard to anatomy, histology, physiology, embryology, classification and ecology—the whole forming a splendid introduction to fundamental zoological principles and methods of study.

Following the study of the frog as an introduction to the study of zoology, Part II. deals with *Amæba*, *Hæmatococcus*, *Euglena*, *Paramecium* and its allies, *Hydra* and hydroids earthworm, crayfish, mussel, *Amphioxus*, dogfish and rabbit. The book closes with some general points in cytology and embryology which have been incidentally referred to in earlier parts of the work.

Most of the descriptive chapters in Part II. are essentially reprints from T. J. Parker's well-known 'Elementary Biology,' even the illustrations of the book being reproduced with additional ones from Parker and Haswell's 'Zoology.' But, although the material is familiar, the setting is decidedly new; and these latter chapters supplement the introductory study of the frog so as to form a well-rounded course in general zoology.

Excellent practical directions for obtaining, preparing and studying zoological materials form appendices to all the chapters, and these are so arranged that the laboratory study proceeds hand in hand with the reading of the descriptions. Those teachers of the American school who have been influenced by the laboratory methods of both Agassiz and Huxley will criticise these directions for practical study, in that the work of the student is practically limited to mere verification. However, the laboratory teacher who wishes to stimulate the spirit of investigation will find no difficulty in